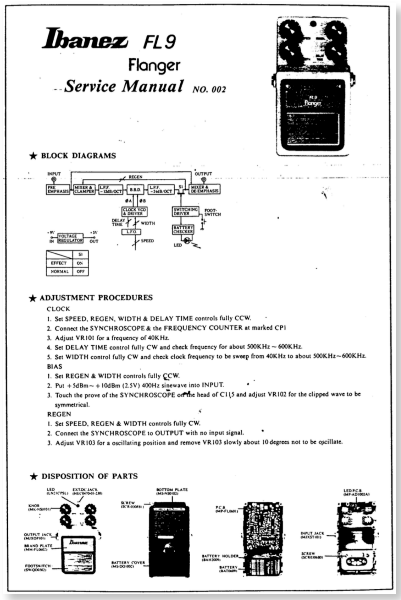
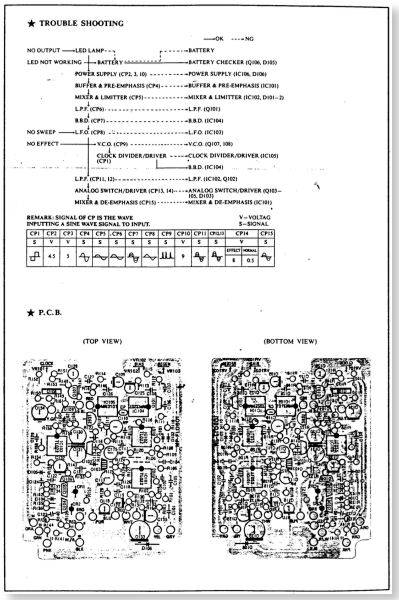
Ibanez

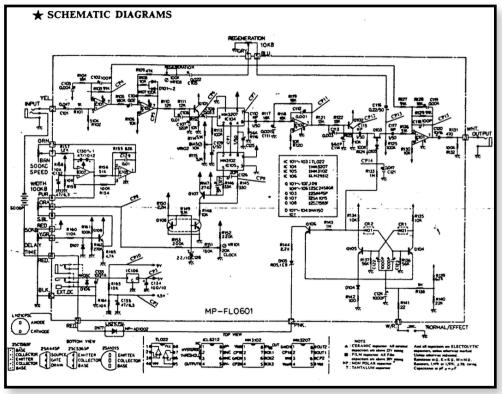
FL9
Flanger

Service Guide

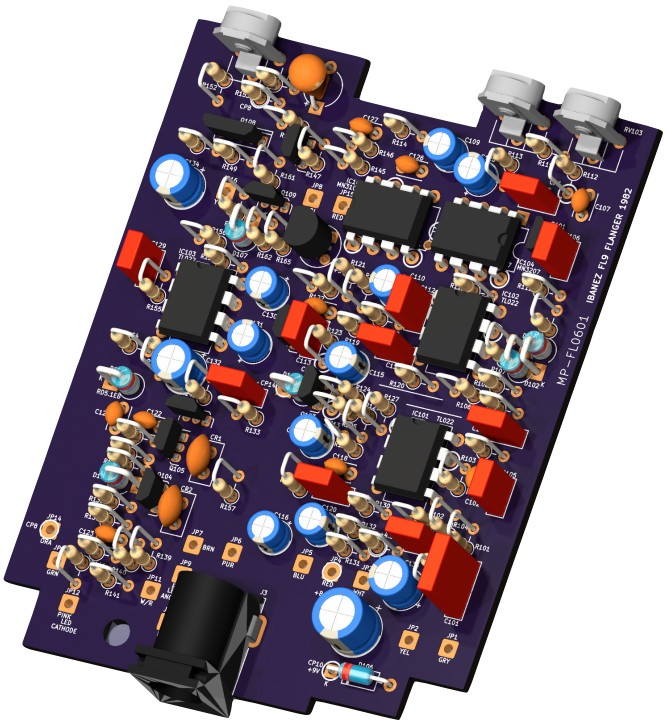
The Ibanez FL9 Flanger Service Guide was compiled from a collection of original and obsolete information to create a useful guide for maintaining this unique guitar pedal. Credit must be given to the authors of the original 1980s era *Service Manual NO. 002* that was used as a template for this updated guide.


Ibanez FL9
Flanger
Service Manual NO. 002
★ BLOCK DIAGRAMS
★ ADJUSTMENT PROCEDURES
CLOCK
1. Set SPEED, REGEN, WIDTH & DELAY TIME controls fully CCW.
2. Connect the SYNCHROSCOPE & the FREQUENCY COUNTER at marked CP1
3. Adjust VR100 for a frequency of 40KHz.
4. Set DELAY TIME control fully CW and check frequency for about 500KHz ~ 600KHz.
5. Set WIDTH control fully CW and check clock frequency to be sweep from 40KHz to about 500KHz~600KHz.
BIAS
1. Set REGEN & WIDTH controls fully CCW.
2. Put +5dBm ~ +10dBm (2.5V) 400Hz sinewave into INPUT.
3. Synch the prove of the SYNCHROSCOPE at the head of C115 and adjust VR102 for the clipped wave to be symmetrical.
REGEN
1. Set SPEED, REGEN & WIDTH controls fully CW.
2. Connect the SYNCHROSCOPE to OUTPUT with no input signal.
3. Adjust VR103 for a oscillating position and remove VR103 slowly about 10 degrees not to be oscillate.
★ DISPOSITION OF PARTS

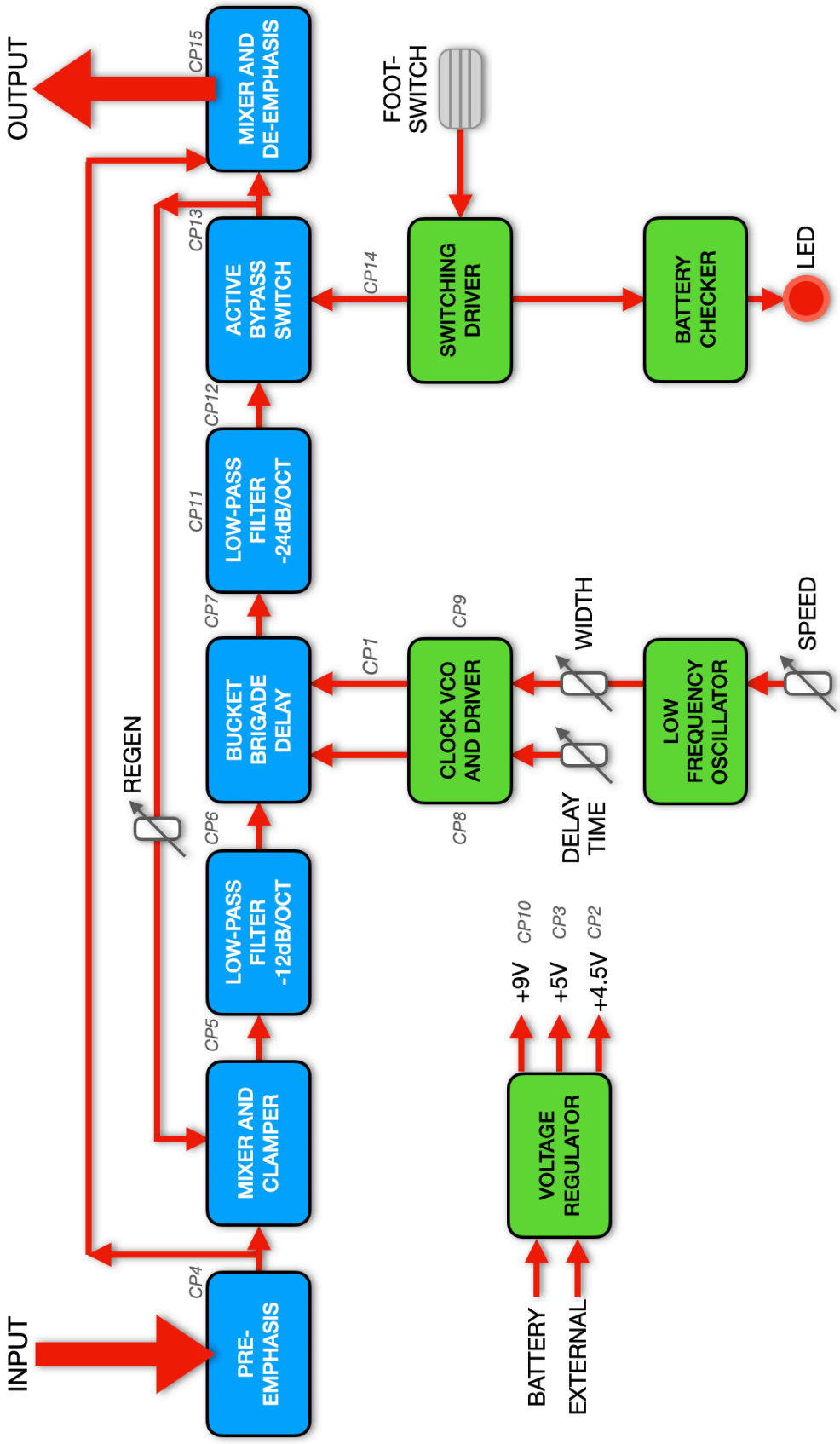




November 26, 2022, Cedar Grove Studios

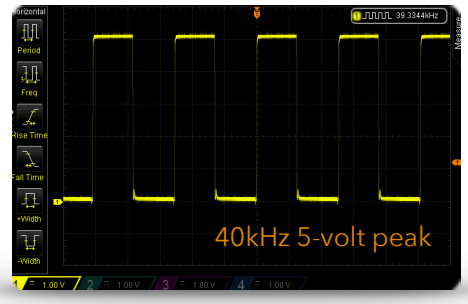


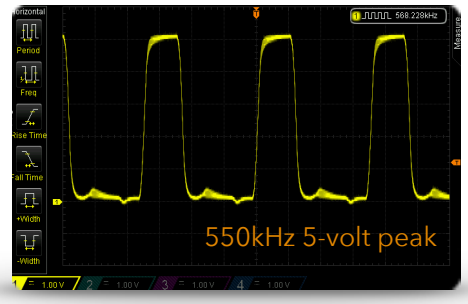
Block Diagram



Adjustment Procedures

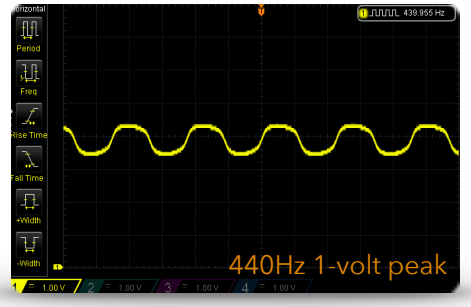
CLOCK





1. Set SPEED, REGEN, WITDH, and DELAY TIME controls fully counter-clockwise (CCW).
2. Connect an oscilloscope to test point CP1.
3. Adjust VR101 CLOCK TRIM for a frequency of 40kHz.
4. Set DELAY TIME control fully clockwise (CW) and check CP1 frequency. Should be in the range of 500kHz to 600kHz.
5. Set WIDTH control fully CW and check CP1 frequency sweep. The range should be from 40kHz to 500kHz-600kHz.

BIAS

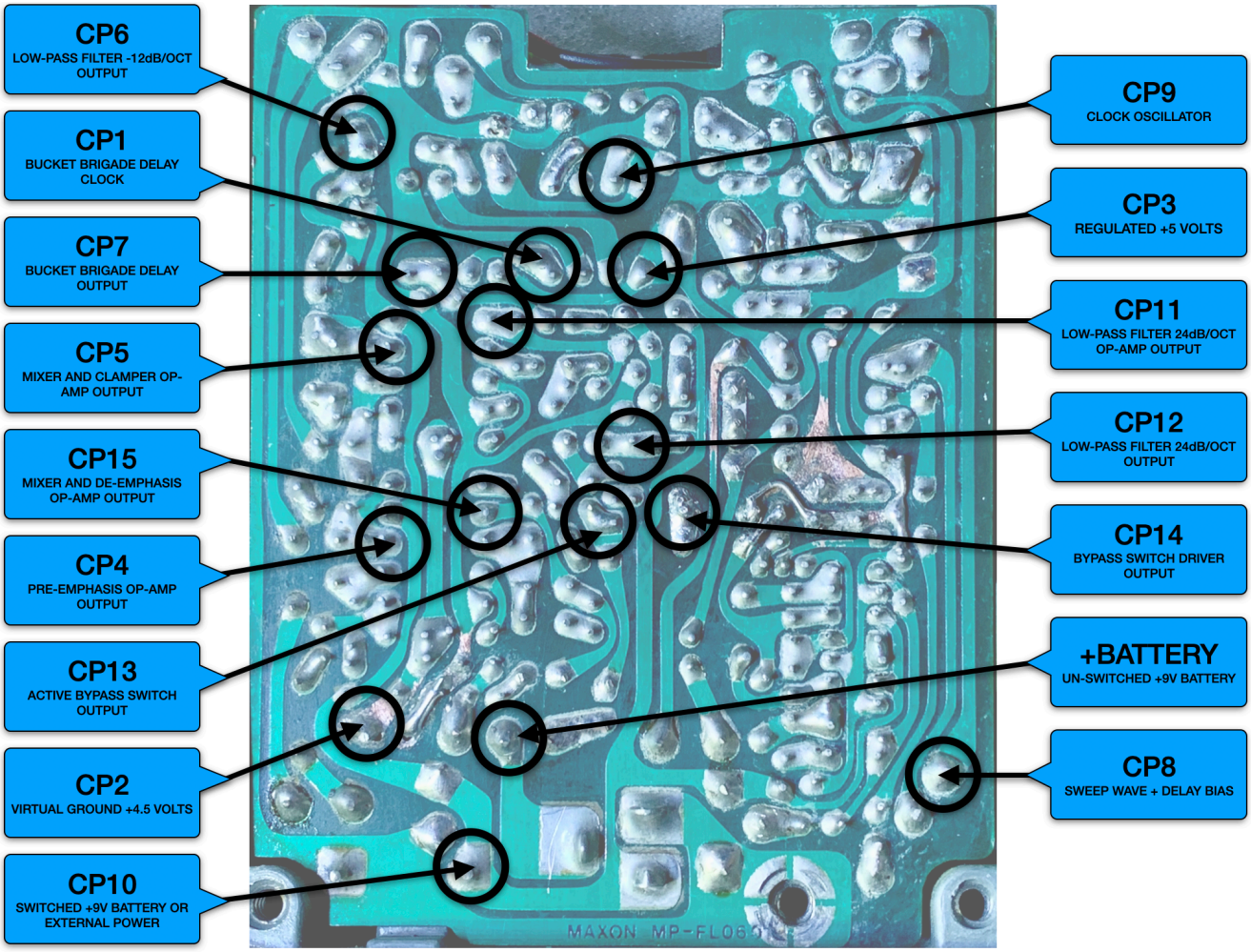


1. Set REGEN and WIDTH controls fully CCW.
2. Connect a +5dBm to +10dBm (2.5 volt) 440Hz sine wave to the INPUT.
3. View the waveform on test point CP12. Adjust VR102 BIAS to achieve a symmetrically-clipped waveform.

REGEN

1. Set SPEED, REGEN, and WIDTH controls fully CW.
2. Connect an oscilloscope to the OUTPUT with no INPUT signal
3. Adjust VR103 REGENERATION TRIM until oscillation is seen. Back down VR103 REGENERATION TRIM about 10 degrees to squelch the oscillation.

Test (Control) Points



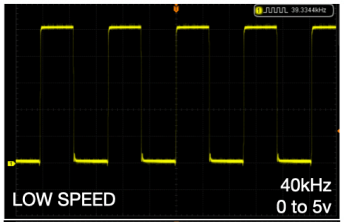
Test Point Signals and Voltages

INPUT

+BATTERY	CP2	CP3	CP10	CP14	
	VIRTUAL GROUND	LOGIC POWER	SWITCHED BATTERY	BYPASS SWITCH DRIVER	
				EFFECT	NORMAL
9V	4.5V	5V	9V	8	0.5

CP1

BUCKET BRIGADE DELAY CLOCK

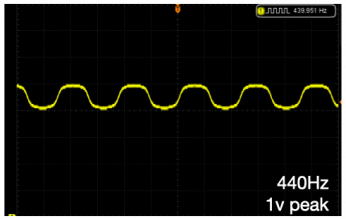


CP4

PRE-EMPHASIS OP-AMP OUTPUT

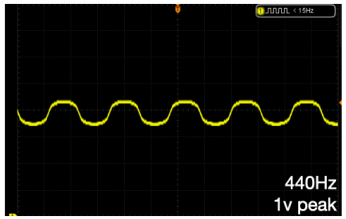
CP5

MIXER AND CLAMPER OP-AMP OUTPUT



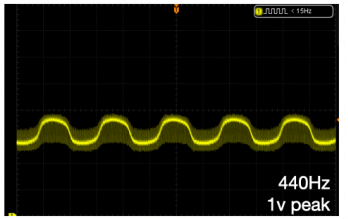
CP6

LOW-PASS FILTER -12db/OCT



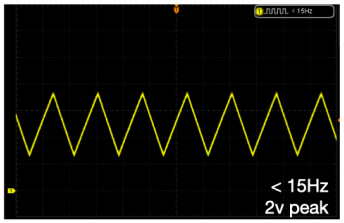
CP7

BUCKET BRIGADE DELAY OUTPUT



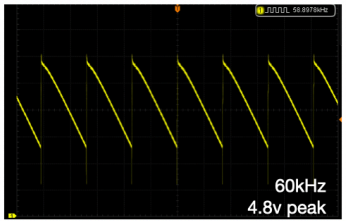
CP8

SWEEP WAVE + DELAY BIAS



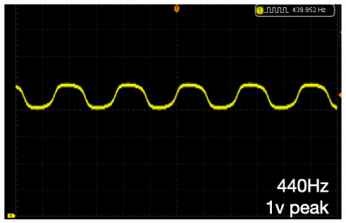
CP9

CLOCK OSCILLATOR



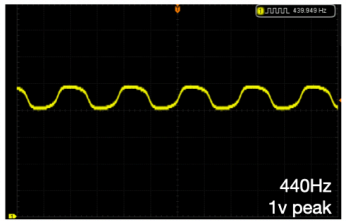
CP11

LOW-PASS FILTER -24db/OCT



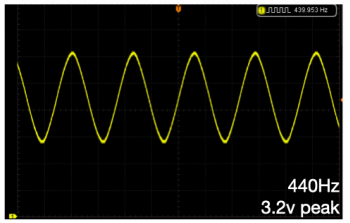
CP13

ACTIVE BYPASS SWITCH OUTPUT



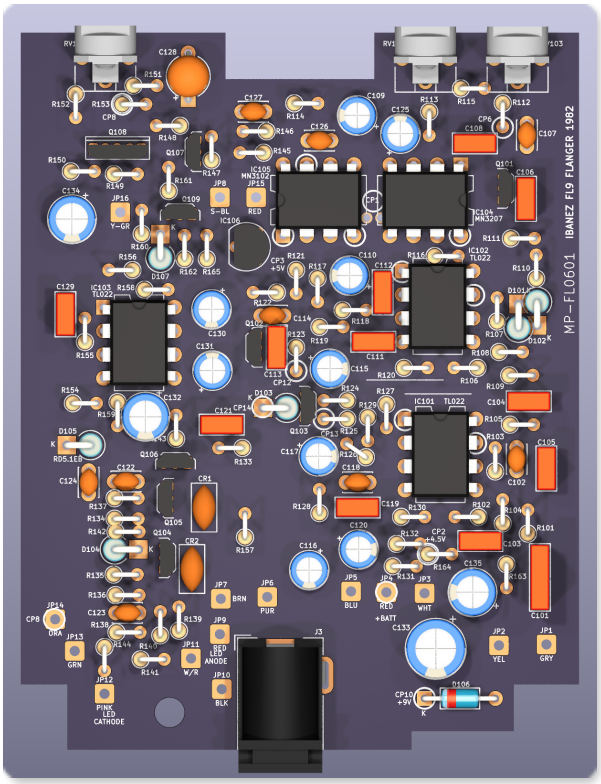
CP15

SIGNAL

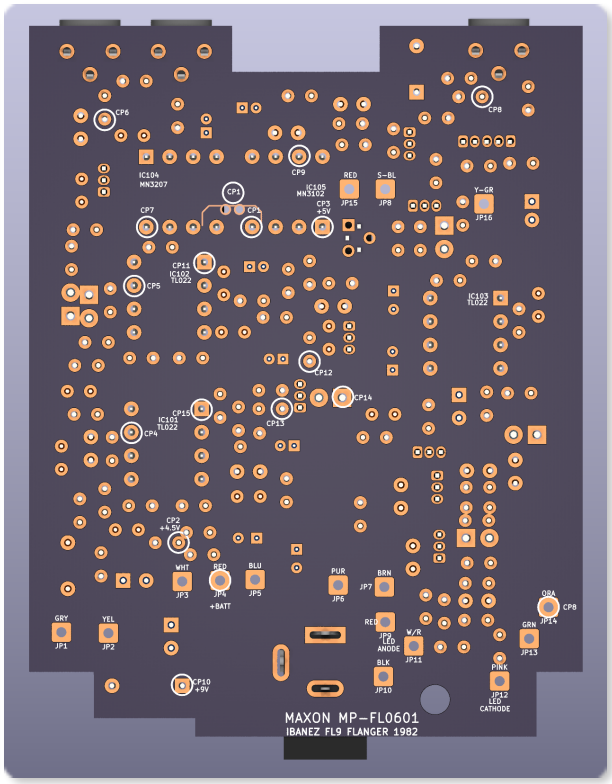


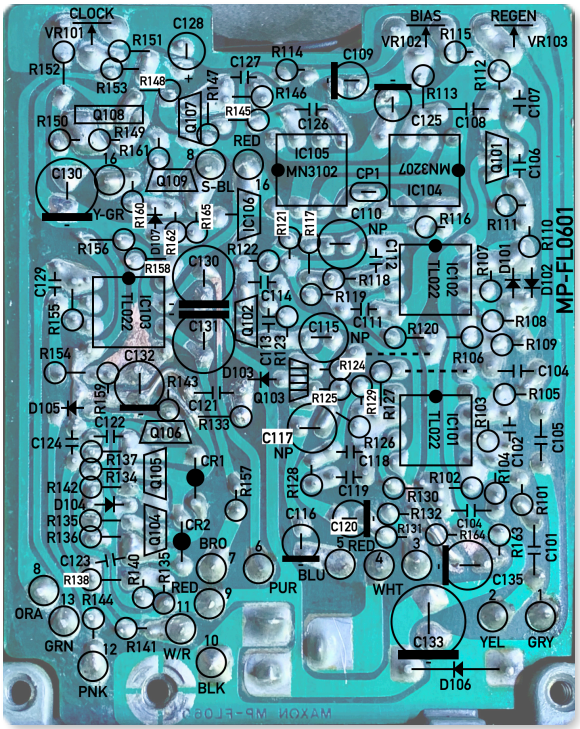
Printed Circuit Board

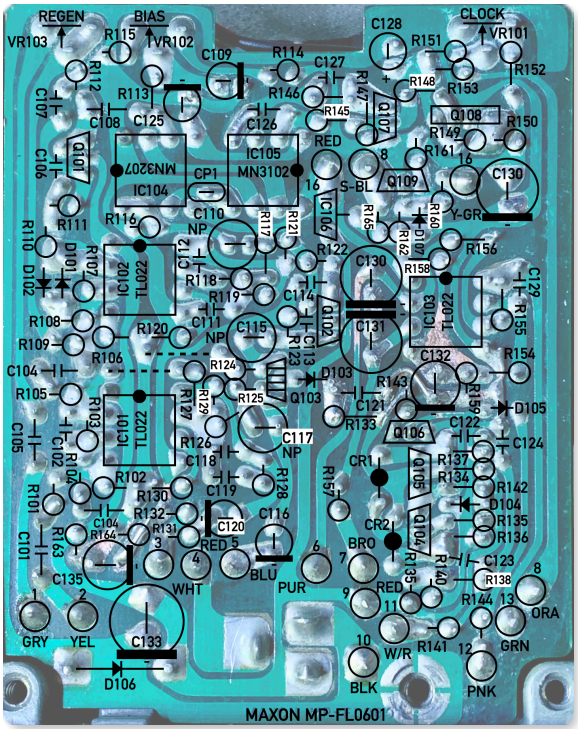
(Top View)



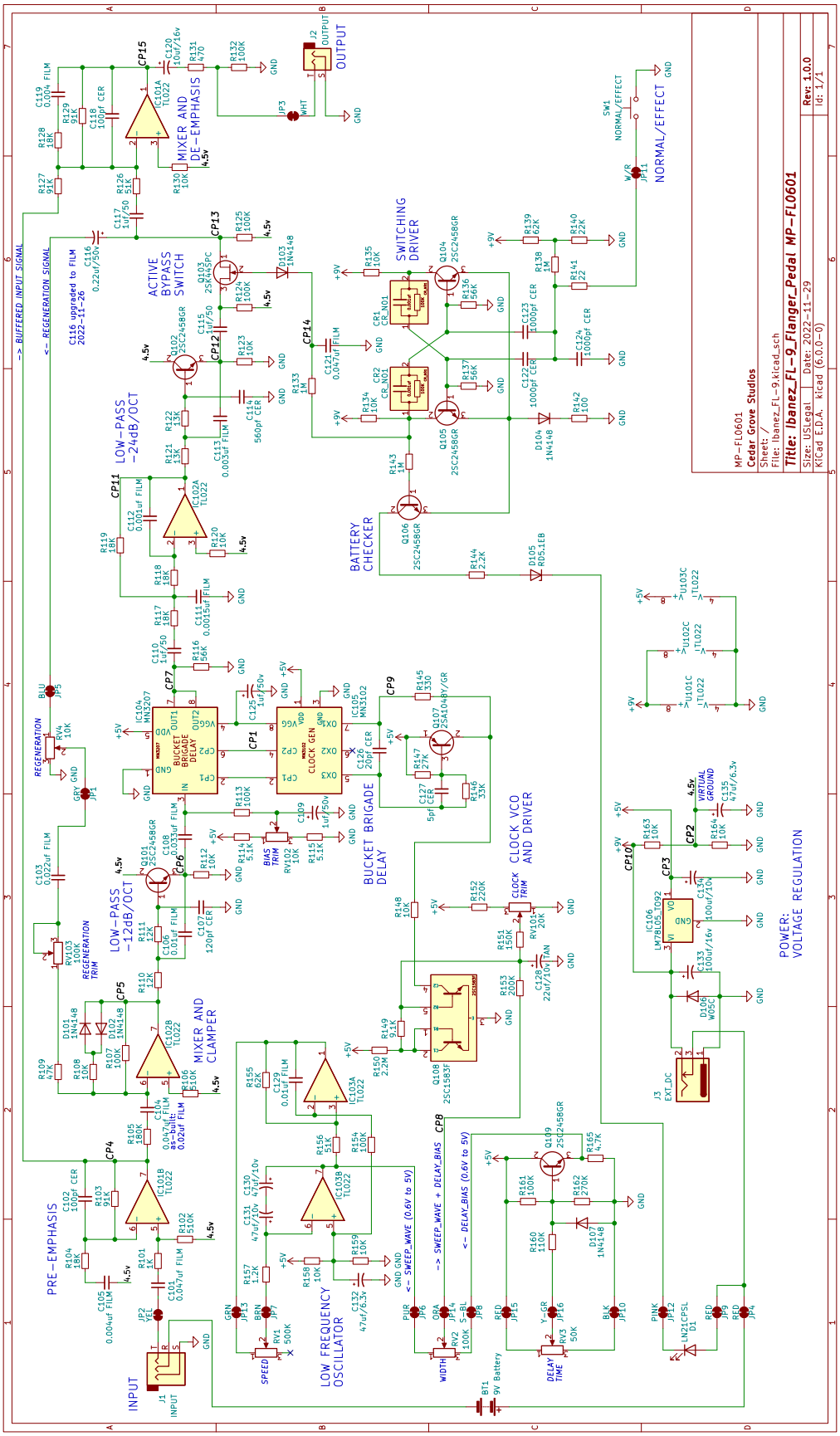
(Bottom View)







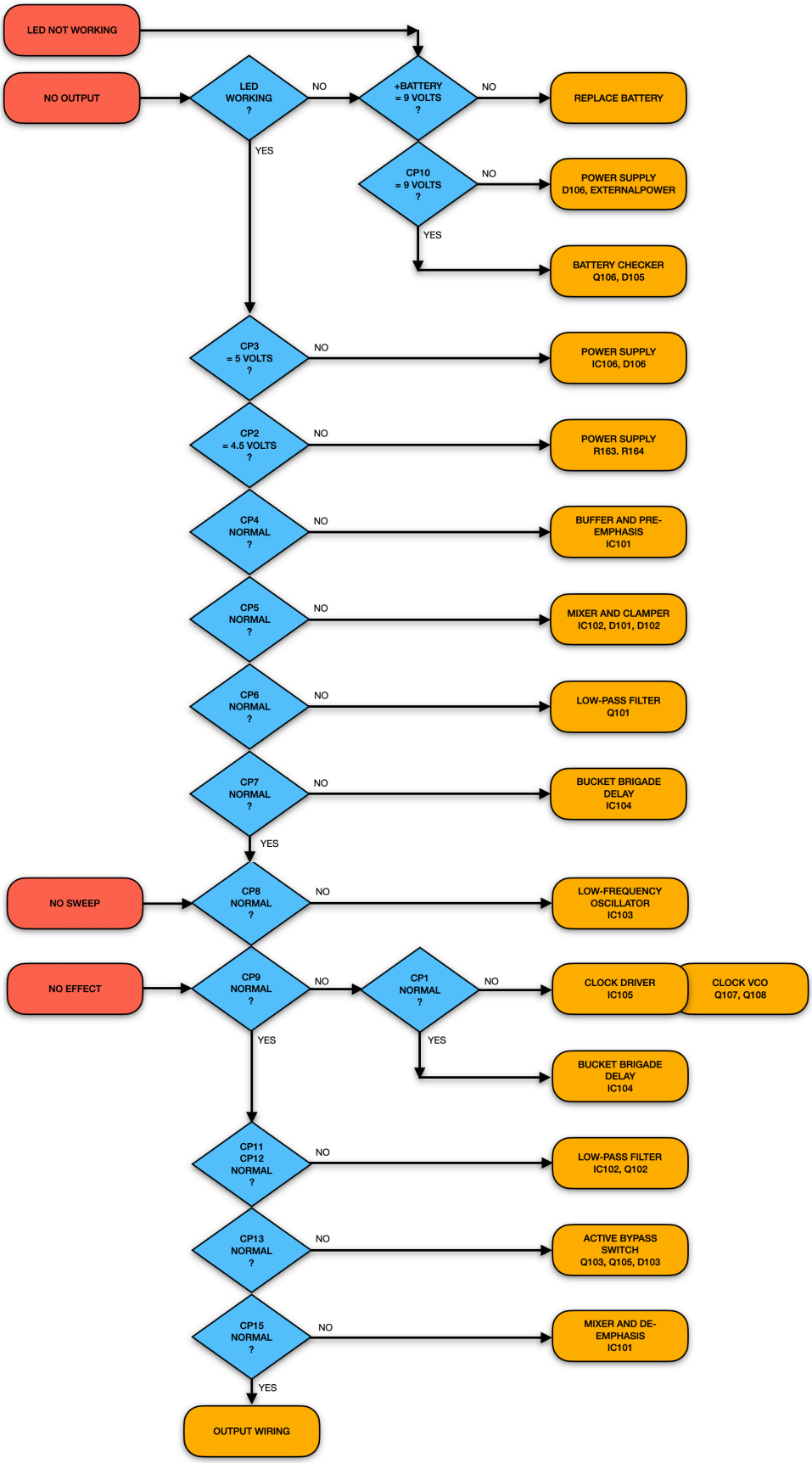
Schematic Diagram



Parts List

Qty	Reference(s)	Value	LibPart	Footprint	Description
1	BT1	9V Battery	Device:Battery		9 Volt
1	C101	0.047uf FILM	Device:C_Small	Capacitor_THT:C_Rect_L7.0mm_W2.0mm_P5.00mm	FILM
2	C102, C118	100pf CER	Device:C_Small	Capacitor_THT:C_Disc_D3.0mm_W2.0mm_P2.50mm	CERAMIC
1	C103	0.022uf FILM	Device:C_Small	Capacitor_THT:C_Rect_L4.6mm_W2.0mm_P2.50mm_MKS02_FKP02	FILM
2	C104, C121	0.047uf FILM	Device:C_Small	Capacitor_THT:C_Rect_L4.6mm_W2.0mm_P2.50mm_MKS02_FKP02	FILM
1	C105	0.004uf FILM	Device:C_Small	Capacitor_THT:C_Rect_L4.6mm_W2.0mm_P2.50mm_MKS02_FKP02	FILM
2	C106, C129	0.01uf FILM	Device:C_Small	Capacitor_THT:C_Rect_L4.6mm_W2.0mm_P2.50mm_MKS02_FKP02	FILM
1	C107	120pf CER	Device:C_Small	Capacitor_THT:C_Disc_D3.0mm_W2.0mm_P2.50mm	CERAMIC
1	C108	0.033uf FILM	Device:C_Small	Capacitor_THT:C_Rect_L4.6mm_W2.0mm_P2.50mm_MKS02_FKP02	FILM
2	C109, C125	1uf/50v	Device:CP1_Small	Capacitor_THT:CP_Radial_D4.0mm_P1.50mm	AL POLARIZED
3	C110, C115, C117	1uf/50	Device:C_Small	Capacitor_THT:CP_Radial_D4.0mm_P1.50mm	AL NON-POLARIZED
1	C111	0.0015uf FILM	Device:C_Small	Capacitor_THT:C_Rect_L4.6mm_W2.0mm_P2.50mm_MKS02_FKP02	FILM
1	C112	0.001uf FILM	Device:C_Small	Capacitor_THT:C_Rect_L4.6mm_W2.0mm_P2.50mm_MKS02_FKP02	FILM
1	C113	0.003uf FILM	Device:C_Small	Capacitor_THT:C_Rect_L4.6mm_W2.0mm_P2.50mm_MKS02_FKP02	FILM
1	C114	560pf CER	Device:C_Small	Capacitor_THT:C_Disc_D3.0mm_W2.0mm_P2.50mm	CERAMIC
1	C116	0.22uf/50v	Device:CP1_Small	Capacitor_THT:CP_Radial_D4.0mm_P2.00mm	AL POLARIZED
1	C119	0.004 FILM	Device:C_Small	Capacitor_THT:C_Rect_L4.6mm_W2.0mm_P2.50mm_MKS02_FKP02	FILM
1	C120	10uf/16v	Device:CP1_Small	Capacitor_THT:CP_Radial_D4.0mm_P2.00mm	AL POLARIZED
3	C122, C123, C124	1000pf CER	Device:C_Small	Capacitor_THT:C_Disc_D3.0mm_W2.0mm_P2.50mm	CERAMIC
1	C126	20pf CER	Device:C_Small	Capacitor_THT:C_Disc_D3.0mm_W2.0mm_P2.50mm	CERAMIC
1	C127	5pf CER	Device:C_Small	Capacitor_THT:C_Disc_D3.0mm_W2.0mm_P2.50mm	CERAMIC
1	C128	22uf/10v TAN	Device:CP1_Small	Capacitor_THT:CP_Radial_Tantal_D4.5mm_P5.00mm	TANTALUM
2	C130, C131	47uf/10v	Device:CP1_Small	Capacitor_THT:CP_Radial_D4.0mm_P2.00mm	AL POLARIZED
2	C132, C135	47uf/6.3v	Device:CP1_Small	Capacitor_THT:CP_Radial_D5.0mm_P2.50mm	AL POLARIZED
1	C133	100uf/16v	Device:CP1_Small	Capacitor_THT:CP_Radial_D6.3mm_P2.50mm	AL POLARIZED
1	C134	100uf/10v	Device:CP1_Small	Capacitor_THT:CP_Radial_D5.0mm_P2.00mm	AL POLARIZED
2	CR1, CR2	CR_N01	Device:CR_N01	Capacitor_THT:C_Disc_D5.0mm_W2.5mm_P2.50mm	RESISTOR-CAPACITOR NETWORK
1	D1	LN21CPSL	Device:LED		LED, CLEAR RED
5	D101, D102, D103, D104, D107	1N4148	Diode:1N4448	Diode_THT:D_T-1_P2.54mm_Vertical_KathodeUp	SIGNAL DIODE, 1N4148
1	D105	RD5.1EB	Device:D_Zener	Diode_THT:D_T-1_P2.54mm_Vertical_KathodeUp	5.1V ZENER DIODE
1	D106	W05C	Diode:1N4448	Diode_THT:D_DO-35_SOD27_P7.62mm_Horizontal	SCHOTTKY DIODE, 50V 500MA
6	IC101, IC102, IC103, U101, U102, U103	TL022	Amplifier_Operational:TL072	Package_DIP:DIP-8_W7.62mm	OPERATIONAL AMPLIFIER
1	IC104	MN3207	Audio:MN3207	Package_DIP:DIP-8_W7.62mm	BUCKET BRIGADE DELAY, 1024 STAGE
1	IC105	MN3102	Timer:MN3102	Package_DIP:DIP-8_W7.62mm	CLOCK GENERATOR
1	IC106	LM78L05_TO92	Regulator_Linear:LM78L05_TO92	Package_TO_SOT_THT:TO-92	VOLTAGE REGULATOR, 5 VOLTS
1	J1	INPUT	Connector:AudioJack3	Connector 0.25-inch TRS Jack	0.25-INCH TRS JACK
1	J2	OUTPUT	Connector:AudioJack2	Connector 0.25-inch TS Jack	0.25-INCH TS JACK
1	J3	EXT_DC	Connector:Barrel_Jack_Switch	Connector_BarrelJack:BarrelJack_Wuerth_6941xx301002	2.1MM BARREL JACK SWITCHED
6	Q101, Q102, Q104, Q105, Q106, Q109	2SC2458GR	Transistor_BJT:2SD1047	Package_TO_SOT_THT:TO-92Flat	NPN BIPOLAR JUNCTION TRANSISTOR (BJT)
1	Q103	2SK44SPC	Device:Q_NJFET_SGD	Package_TO_SOT_THT:TO-92Flat	N-CHANNEL JUNCTION FIELD EFFECT TRANSISTOR (JFET)
1	Q107	2SA1048Y/GR	Transistor_BJT:2SA1015	Package_TO_SOT_THT:TO-92Flat	HIGH-SPEED BIPOLAR JUNCTION TRANSISTOR (BJT)
1	Q108	2SC1583F	Transistor_Array:2SC1583F	Package_TO_SOT_THT:TO-92Flat_5-PIN	DUAL MATCHED NPN TRANSISTOR NETWORK
1	R101	1K	Device:R_Small	Resistor_THT:R_Axial_DIN0204_L3.6mm_D1.6mm_P2.54mm_Vertical	1/8W 5% RESISTOR
2	R102, R106	510K	Device:R_Small	Resistor_THT:R_Axial_DIN0204_L3.6mm_D1.6mm_P2.54mm_Vertical	1/8W 5% RESISTOR
3	R103, R127, R129	91K	Device:R_Small	Resistor_THT:R_Axial_DIN0204_L3.6mm_D1.6mm_P2.54mm_Vertical	1/8W 5% RESISTOR
5	R104, R117, R118, R119, R128	18K	Device:R_Small	Resistor_THT:R_Axial_DIN0204_L3.6mm_D1.6mm_P2.54mm_Vertical	1/8W 5% RESISTOR
1	R105	180K	Device:R_Small	Resistor_THT:R_Axial_DIN0204_L3.6mm_D1.6mm_P2.54mm_Vertical	1/8W 5% RESISTOR
7	R107, R113, R124, R125, R132, R154, R161	100K	Device:R_Small	Resistor_THT:R_Axial_DIN0204_L3.6mm_D1.6mm_P2.54mm_Vertical	1/8W 5% RESISTOR
12	R108, R112, R120, R123, R130, R134, R135, R148, R158, R159, R163, R164	10K	Device:R_Small	Resistor_THT:R_Axial_DIN0204_L3.6mm_D1.6mm_P2.54mm_Vertical	1/8W 5% RESISTOR
1	R109	47K	Device:R_Small	Resistor_THT:R_Axial_DIN0204_L3.6mm_D1.6mm_P2.54mm_Vertical	1/8W 5% RESISTOR
2	R110, R111	12K	Device:R_Small	Resistor_THT:R_Axial_DIN0204_L3.6mm_D1.6mm_P2.54mm_Vertical	1/8W 5% RESISTOR
2	R114, R115	5.1K	Device:R_Small	Resistor_THT:R_Axial_DIN0204_L3.6mm_D1.6mm_P2.54mm_Vertical	1/8W 5% RESISTOR
3	R116, R136, R137	56K	Device:R_Small	Resistor_THT:R_Axial_DIN0204_L3.6mm_D1.6mm_P2.54mm_Vertical	1/8W 5% RESISTOR
2	R121, R122	13K	Device:R_Small	Resistor_THT:R_Axial_DIN0204_L3.6mm_D1.6mm_P2.54mm_Vertical	1/8W 5% RESISTOR
2	R126, R156	51K	Device:R_Small	Resistor_THT:R_Axial_DIN0204_L3.6mm_D1.6mm_P2.54mm_Vertical	1/8W 5% RESISTOR
1	R131	470	Device:R_Small	Resistor_THT:R_Axial_DIN0204_L3.6mm_D1.6mm_P2.54mm_Vertical	1/8W 5% RESISTOR
3	R133, R138, R143	1M	Device:R_Small	Resistor_THT:R_Axial_DIN0204_L3.6mm_D1.6mm_P2.54mm_Vertical	1/8W 5% RESISTOR
2	R139, R155	62K	Device:R_Small	Resistor_THT:R_Axial_DIN0204_L3.6mm_D1.6mm_P2.54mm_Vertical	1/8W 5% RESISTOR
1	R140	22K	Device:R_Small	Resistor_THT:R_Axial_DIN0204_L3.6mm_D1.6mm_P2.54mm_Vertical	1/8W 5% RESISTOR
1	R141	22	Device:R_Small	Resistor_THT:R_Axial_DIN0204_L3.6mm_D1.6mm_P2.54mm_Vertical	1/8W 5% RESISTOR
1	R142	100	Device:R_Small	Resistor_THT:R_Axial_DIN0204_L3.6mm_D1.6mm_P2.54mm_Vertical	1/8W 5% RESISTOR
1	R144	2.2K	Device:R_Small	Resistor_THT:R_Axial_DIN0204_L3.6mm_D1.6mm_P2.54mm_Vertical	1/8W 5% RESISTOR
1	R145	330	Device:R_Small	Resistor_THT:R_Axial_DIN0204_L3.6mm_D1.6mm_P2.54mm_Vertical	1/8W 5% RESISTOR
1	R146	33K	Device:R_Small	Resistor_THT:R_Axial_DIN0204_L3.6mm_D1.6mm_P2.54mm_Vertical	1/8W 5% RESISTOR
1	R147	27K	Device:R_Small	Resistor_THT:R_Axial_DIN0204_L3.6mm_D1.6mm_P2.54mm_Vertical	1/8W 5% RESISTOR
1	R149	9.1K	Device:R_Small	Resistor_THT:R_Axial_DIN0204_L3.6mm_D1.6mm_P2.54mm_Vertical	1/8W 5% RESISTOR
1	R150	2.2M	Device:R_Small	Resistor_THT:R_Axial_DIN0204_L3.6mm_D1.6mm_P2.54mm_Vertical	1/8W 5% RESISTOR
1	R151	150K	Device:R_Small	Resistor_THT:R_Axial_DIN0204_L3.6mm_D1.6mm_P2.54mm_Vertical	1/8W 5% RESISTOR
1	R152	220K	Device:R_Small	Resistor_THT:R_Axial_DIN0204_L3.6mm_D1.6mm_P2.54mm_Vertical	1/8W 5% RESISTOR
1	R153	200K	Device:R_Small	Resistor_THT:R_Axial_DIN0204_L3.6mm_D1.6mm_P2.54mm_Vertical	1/8W 5% RESISTOR
1	R157	1.2K	Device:R_Small	Resistor_THT:R_Axial_DIN0204_L3.6mm_D1.6mm_P2.54mm_Vertical	1/8W 5% RESISTOR
1	R160	110K	Device:R_Small	Resistor_THT:R_Axial_DIN0204_L3.6mm_D1.6mm_P2.54mm_Vertical	1/8W 5% RESISTOR
1	R162	270K	Device:R_Small	Resistor_THT:R_Axial_DIN0204_L3.6mm_D1.6mm_P2.54mm_Vertical	1/8W 5% RESISTOR
1	R165	4.7K	Device:R_Small	Resistor_THT:R_Axial_DIN0204_L3.6mm_D1.6mm_P2.54mm_Vertical	1/8W 5% RESISTOR
1	RV1	500K	Device:R_Potentiometer		POTENTIOMETER, CHASSIS MOUNT
1	RV2	100K	Device:R_Potentiometer		POTENTIOMETER, CHASSIS MOUNT
1	RV3	50K	Device:R_Potentiometer		POTENTIOMETER, CHASSIS MOUNT
1	RV4	10K	Device:R_Potentiometer		POTENTIOMETER, CHASSIS MOUNT
1	RV101	20K	Device:R_Potentiometer	Potentiometer_THT:Potentiometer_ACP_CA6-H2,5_Horizontal	TRIMMER POTENTIOMETER
1	RV102	10K	Device:R_Potentiometer	Potentiometer_THT:Potentiometer_ACP_CA6-H2,5_Horizontal	TRIMMER POTENTIOMETER
1	RV103	100K	Device:R_Potentiometer	Potentiometer_THT:Potentiometer_ACP_CA6-H2,5_Horizontal	TRIMMER POTENTIOMETER
1	SW1	NORMAL/EFFECT	Switch:SW_Push		SPST PUSH BUTTON SWITCH, MOMENTARY

Troubleshooting



Service History

Serial Number 338784

Date	Service Description
2022-11-20	Replaced electrolytic capacitors: C109, C120, C125, C130, C131, C132, C133, C134, C135. While working on the board, C121 film was accidentally scratched.. C121 was replaced with a ceramic capacitor since it's not in the audio signal chain. Upgraded C116 electrolytic with film. Powered-up the pedal with a battery and successfully tested with a guitar input. Still waiting for C110, C115, and C117 non-polarized aluminum capacitors to arrive from DigiKey.
2022-11-25	Conducted the calibration procedure. Captured oscilloscope waveforms. No adjustments were required..
2022-12-02	Replaced C110, C115, and C117 non-polarized electrolytic capacitors.. Tested and re-checked calibration. No adjustments were required. Captured oscilloscope waveforms for all test points. Updated guide with waveform images.